

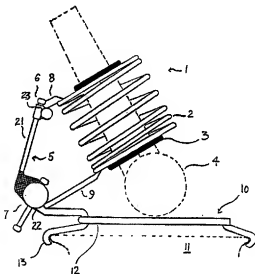


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: MICROPHONE MOUNTING DEVICE**(57) Abstract**

Microphone mounting device for fixing of a generally elongate microphone (4) to an acoustic instrument (11), or in another situation in which propagation of mechanical noise to the microphone is to be prevented. The mounting device comprises a fastening means (10; 17) to be mounted with the instrument (11), and a retaining element (2) for a microphone. The fastening means (10) is connected with the microphone mounting device (1) through an adjustment means (5) being pivotable about at least one axis to adjust the distance of, and orientation of, the microphone with respect to the instrument (11). The retaining element (2) is generally cylindrical and the internal diameter thereof is sufficiently large to accommodate the microphone (4). At least one suspension (3) for the microphone (4) is fixed to the retaining element (2), the suspension (3) being comprised of an elastic material and forming a connection between the microphone (4) and the microphone mounting device (1) that has very little acoustic conductivity.



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Microphone mounting device.

The present invention concerns a microphone mounting device as stated in the
5 introductory of claim 1, 5 and 7.

When sound from acoustic instruments is to be amplified electronically, a
microphone in a microphone stand has to be located adjacent to the instrument. For
some instruments e.g. wind instruments, a frequent problem is that the distance
between the instrument and the microphone will vary during the performance. This
10 results in an uneven sound if the microphone is mounted in an ordinary floor stand.

In some cases, the same microphone is used with different instruments without
adjusting the sound, which may result in bad sound. Experience has shown that
every single instrument must have its own microphone to provide a satisfactory
sound picture.

15 Microphone mounting devices have been developed whereby the microphone
can be fixed directly onto a wind instrument, thus ensuring that the microphone is
positioned in the same distance from the sound source. However, such microphones
have only limited adjustment possibilities, and tend to absorb sound waves which
propagate through the mounting device. These sounds are considered as noise, which
20 originate from mechanical noise from the instrument and other undesirable sources.

US Patent no. 4,194,096 describes a microphone mounting device to attach a
generally extended microphone to a stand in order, to avoid transfer of mechanical
noise to the microphone. The generally cylindrically shaped microphone is provided
at each end with a rubber band or the like, which is stretched diametrically across
25 the cylindrical cross section, thus providing a fastener for the microphone. The
mounting device is moreover provided with a pivotable adjusting means. This
microphone is, however, designed to be used on a stand and to offer the possibility
of removing the microphone from the mounting device. One of the drawbacks of this
mounting device is that it, with its 2 x 2 points of contact between the microphone
30 and the elastic band, is not able to keep the microphone sufficiently stable except in
the horizontal position and in situations in which the microphone/microphone stand
is/are subject to small vibrations. This microphone mounting device, if fixed to a

percussion instrument, in which the microphone is often directed down to e.g. a cymbal, will therefore be unable to keep the microphone sufficiently stable or even keep the same in place in the mounting device. A corresponding drawback will also occur with e.g. wind instruments, since during a performance the instrument is frequently in constant motion.

It is therefore an object of the present invention to provide a microphone mounting device that is versatile in use and transmits as little mechanical noise as possible.

These objects are achieved with a means as stated in the characterizing part of claim 1, 5 and 7. Further features appear from the accompanying dependent claims.

10 In the following, the invention is described in more detail by means of an example of an embodiment and with reference to accompanying drawings, in which

Figure 1 shows, in side view, a first embodiment of a microphone mounting device, according to the present invention, intended for mounting to a wind instrument,

15 Figure 2 shows the microphone mounting device of Figure 1 when viewed towards the instrument,

Figure 3 shows the microphone mounting device of Figure 1, in a folded position,

Figure 4 illustrates, in top view, a second embodiment of a microphone mounting device according to the present invention,

20 Figure 5 illustrates the embodiment of Figure 4, in side view,

Figure 6 shows, in side view, a third embodiment of a microphone mounting device according to the present invention,

Figure 7 illustrates, in side view, a clamp for use in connection with a stand system for a microphone mounting device according to the present invention,

25 Figure 8 shows the clamp of Figure 7,

Figure 9 illustrates a joint having a pivotable sleeve guide included in the stand system,

Figure 10 shows a branch joint included in the stand system,

30 Figure 11 illustrates a pipe having a fixed sleeve guide included in the stand system,

Figure 12 illustrates a joint having a fixed sleeve guide included in the stand system,

Figure 13 shows several microphone mounting devices according to the present invention, mounted in the stand system in connection with a percussion instrument,

Figure 14 shows a three dimensional section through an end section of an alternative embodiment of the present invention,

- 5 Figure 14a shows the microphone mounting device of Figure 14, partly sectioned, along the line a-a,

Figure 15 shows the microphone mounting device in an imaginary diametrical section, in which the elastic suspensions for the microphone are stretched, and

- Figure 15a shows the same as Figure 15, but with the elastic bands in an
10 unstrained position.

Figure 1-3 shows a microphone mounting device 1 in accordance with the present invention. The microphone mounting device 1 comprises an external retaining element 2, which in this embodiment is formed as a spiral spring. The retaining element 2 is provided with two suspensions 3, each comprising two elastic bands,
15 here in the form of rubber bands 3, arranged at an angle with respect to each other, and to which a microphone 4 is releasably mounted.

- Moreover, an adjustment means 5 is fixed to the retaining element 2. The adjustment means 5 is mounted to the retaining element 2 via upper and lower rods 8 and 9. The upper rod 8 is pivotally connected by a joint 6 to an arm 21 the opposite
20 end of which is connected with a joint 7. The joints 6 and 7 are provided with retaining screws 23 and 22, respectively. The lower rod 9 is connected with the joint 7, so that the arm 21 and the rod 9 can pivot with respect to each other when the retaining screw 23 is loosened. The rods 8 and 9 are fixedly connected to the retaining element 2. In this way rods 8 and 9, the main axis of the retaining element
25 2 and the arm 21 form a trapeze.

- In this embodiment, the retaining element 2 can be folded, as shown in Figure 3. By loosening the screws 22 and 23 on the respective joints 7 and 6, arm 21 can pivot about the rods 8 and 9, and the length of the retaining element 2 can be adjusted in relation to the microphone to be used. By loosening the screw 22, the microphone
30 mounting device 1 including the microphone 4 can be pivoted towards, or away from, a sound source with which the microphone is connected.

In the example shown in Figures 1-3, there is a fastening means 10 for mounting

to a wind instrument 11. The fastening means 10 comprises a resilient mount arrangement which is generally of annular shape and resilient mount arrangement 12 which is shaped generally as an open ring, provided with at least three hooks 13, intended to snap-fit onto the mouth of the wind instrument. The hooks 13 are
5 preferably coated with a plastic material or the like, to avoid scratching or damage to the instrument 11.

Figure 2 illustrates a suspension 3 for the microphone 4, comprising rubber bands 3. The two rubber bands 3 are located at an angle perpendicular to each other and are connected to hooks 14 at the periphery of the retaining element 2. A couple of
10 rubber bands 3 are provided at the lower end of the retaining element 2, and a couple of rubber bands 3 are provided at the upper end of the retaining element 2. In use the microphone is located between the rubber bands, thus establishing a free suspension in which very little mechanical noise is transferred to the microphone.

Figure 4-5 shows a second embodiment of the present invention which is
15 particularly intended for use with a percussion instrument. In this embodiment, the retaining element 2 and the rubber bands 3 are constructed in similar manner to the embodiment shown in Figures 1-3. The microphone mounting device 1 is connected with a stand 17 through at least two joints 15 and 16, which preferably have pivot axes perpendicular to each other. This provides a desirable degree of adjustability of
20 the microphone 4.

Figure 6 shows further an embodiment in accordance with the present invention. Here, the spiral shaped retaining element 2 is replaced by a cage like arrangement having a lower and an upper ring 18 and intermediate strut 19. The rubber bands 3 are connected to the lower and upper rings 18.

25 Figures 7 and 8 illustrate a clamp 25 included in a stand system for use in connection with microphone mounting devices 1 in accordance with the present invention. The clamp 25 is adapted to be mounted with percussion stand having varying pipe dimensions. The claim 25 comprises two mutually pivotable arms 26 and 27 that are fixed to the percussion stand 30 with a wing nut 28. The wing nut 28
30 is screwed towards brackets 43 on the second arm 27. Further branch joints are fixed via wing nut 29.

Figure 9 shows a joint 31 having a pivotable sleeve guide mounted via a knurled

screw 32. A hole 34 can, for example, enable joint 31 to be mounted to the clamp 25 by the wing nut 29 on the clamp. The stand 17 for the microphone mounting device is fastened by a knurled screw 33.

Figure 10 shows a branch joint 35 comprising two arms 36 and 37, having holes 34 located at different distances from the fastener formed by knurled nut 38. Figure 11 shows a pipe 39 having a fixed sleeve guide. Figure 12 illustrates a joint 40 having a fixed sleeve guide.

The different modules that are included in the stand system can be mounted in different ways. Figure 13 shows an example of a mounting in connection with a percussion 20. The microphone mounting device 1 in accordance with the present invention will to a limited degree absorb mechanical vibrations, which permits the microphones 4 to be mounted by means of clamps directly to the stands of the percussion. Using the different components 25, 30, 35, 39 and 40 that are included in the stand system, microphone mounting devices 1 can be mounted with stability and in an optimal position.

In an alternative embodiment, the microphone mounting device in accordance with the invention is provided with means for the loosening, alternatively mounting, of a microphone in the mounting device, in which the elastic rubber bands are extended by a simple grip in their radial direction, thus establishing a through passage between the respective bands. In the following, the description deals with only one end of the microphone mounting device; a corresponding construction will appear at the opposite end (seen axially).

Figure 14, 14a, 15 and 15a shows one embodiment of a microphone mounting device according to the present invention, in which identical reference numerals are used for similar components. The microphone mounting device comprises, in this embodiment, an external generally cylindrical housing 50a and an internal, generally cylindrical housing 50b, in which the internal housing 50b is arranged concentrically with the external housing 50a and inside the latter. In this way the external housing can be turned about the common axis 50 with respect to the internal housing.

The external housing 50a has at the internal surface and at each end thereof at least two pairs of carrier pins. The carrier pins in one end of the housing are represented by the reference numerals 51, 52, 53, 54 (Figure 14a) with each pin

extending out of the end of the housing 50a in a direction parallel to the main axis 50 of the housing and in a direction away from the end of the respective housing. The carrier pins 51,52 and 53,54 in each pair are arranged on diametrically opposed sides of the main axis 50 of the housing. Each pair is radially displaced so that the
5 respective pin-pairs 51,52 and 53,54 forms a mutual angle in the radial direction, the angle preferably being 45° , but the invention is not dependent on this.

The internal housing 50b is correspondingly provided at each end thereof with at least two pairs of axially extending pins 55,56 and 57,58, said pins serving as fastening means for the elastic bands 59 and 60 (Figure 15 and 15a). Each pin
10 protrudes out of the end of the housing 50b, preferably as an extension of the housing *per se*, and is parallel with the main axis 50 of the housing in a direction out of the respective end of the housing. The carrier pins in each pair 55,56 and 57,58 are located on diametrically opposed sides of the housing axis 50. Each pair 55,56 and 57,58, respectively, are radially displaced so that the respective pin pairs 55,56
15 and 57,58 forms a mutual angle in the radial direction this angle corresponding to the mutual angle of the carrier pins of the external housing. The pins 55,56,57,58 of the internal housing are, when the internal housing is accommodated in the external housing, located outside the carrier pins 51,52,53,54 of the external housing 50a, as viewed in the radial direction. The pins in two pin pairs of the external and internal
20 housing, respectively, (e.g. 53,54 versus 57,58) coincide along a common diameter line as viewed generally perpendicular to the common axis of the housings. "Generally perpendicular" means that the respective elastic bands necessarily not have to be stretched across opposite carrier pins of the external housing, thus forming an angle of 90° with respect to (normal to) the common axis of the
25 housings. The angle may, for example, be 70° with respect to the common axis 50 without adversely affecting operation of the bands 59,60.

Moreover, the internal housing is provided with a fixing device 61 for fixing of the microphone mounting device to a stand or the like (not illustrated), which fixing device 61 extends through a slit shaped recess 62 formed in the external housing
30 50a. Recess 62 extends around the periphery of the housing 50a. To prepare the microphone mounting device in accordance with the present invention for use, an elastic band or the like, indicated by reference numeral 59 and 60 for one end of the

cylinder shaped housing, is stretched between each pin pair of the inner housing 50b, i.e. diametrically opposed pins 55,56 and 57,58, respectively, so that the microphone in each end exhibits two elastic bands 59 and 60 arranged at an angle with respect to each other, preferably 45°, the anchorage point being located at the respective pins 55,56 and 57,58, respectively, of the internal housing 50a. In order to facilitate the mounting to or alternatively removal of a microphone from (not illustrated) the present microphone mounting device, the user may stretch the respective bands 59 and 60 (Figure 15 and 15a) by turning the external housing 50a with respect to the internal housing 50b, whereupon the carrier pins 51,52 and 53,54 of the internal housing 50a stretch the bands 60 and 50 away from the pins 55,56 and 57,58, respectively, of the internal housing 50b with respect to the external housing 50a. When the microphone in question is mounted (alternatively removed from) between the stretched bands, the bands are brought back to their original position by simply releasing the grip on the external housing whereupon the housing will turn back because of the return spring effect of the bands. The fixing device 61 can in an alternative embodiment be fixedly connected with the external house, whereby the bands 59,60 are stretched, alternatively relaxed, by effecting a turning of the internal housing, e.g. by means of a control handle connected with the internal housing (not shown).

As described above and shown in the enclosed drawings, the carrier pins of the external housing are located inside the pins of the internal housing, viewed in the radial direction, but their mutual radial location radially can naturally be reversed, whereupon the pins of the external housing are located at a distance farther away from the common axis of the housings, as compared with the pins of the internal housing (not shown). Moreover, each end of the microphone can be provided with more than two bands, and accordingly more pins to provide further stability to the microphone during use.

The microphone mounting device illustrated in Figures 14-15 can be provided with an annularly shaped mount arrangement, e.g. as illustrated in Figure 1 in yet another embodiment of the present invention intended for use on a wind instrument.

Claims.

1. Microphone mounting device for fixing of a generally elongate microphone (4) to an acoustic wind instrument (11), comprising:
 - a fastening means (10) connected to the microphone mounting device (1) through an adjustment means (5), which is pivotable about at least one axis for adjusting the distance of and orientation of the microphone (4) with respect to the instrument (11),
 - a generally cylindrical retaining element (2) for the microphone the internal diameter of which is sufficiently large to accommodate the microphone (4), and
 - at least two suspensions (3) for the microphone (4), preferably located at the ends of the retaining element (2) and being fixed to the same, the suspensions (3) comprising elastic bands, rubber bands or the like, stretched diametrically across the retaining element (2) to thereby form a connection between the microphone (4) and the microphone mounting device (1) that has very little acoustic conductivity, characterized in that each suspension (3) comprises at least two elastic bands arranged in an angle with respect to each other, the fastening means (10) comprising a resilient open, annularly shaped mount (12), provided with at least three fastener hooks (13) adapted to engage with the mouth (11) of the instrument, as the resilient mount (12) urges the fastener hooks (13) towards the center of the instrument mouth.
2. Microphone mounting device in accordance with claim 1, characterized in that the fastener hooks (13) are coated with an elastic material, such as plastic or rubber, arranged to prevent transfer of vibrations indirectly to the microphone and to the microphone and to prevent scratching or other damage to the instrument.
3. Microphone mounting device in accordance with claim 1 or 2, characterized in that the adjustment means (5) comprises:
 - an upper rod (8) fixedly connected with one end of the retaining element (2),
 - a lower rod (9) fixedly connected with the other end of the retaining element (2),
 - an arm (21) pivotably connected to the upper rod (8) and the lower rod (9) at upper and lower joints (6,7) respectively, which joints (6,7) can be tightened by retaining screws (23,22), respectively.

4. Microphone mounting device in accordance with anyone of claims 1-3, characterized in that the retaining element (2) is formed as a foldable spiral (2).

5. Microphone mounting device for mounting of a generally elongate microphone (4) to a stand (17) for use on percussion (20), or in a situation where low propagation of mechanical noise to the microphone (4) is desired, the device comprising

a means (10) connected with the microphone mounting device (1) through an adjustment means, for mounting the microphone mounting device (1) to the stand (17),
a generally cylindrical retaining element (2) for a microphone the internal diameter of which is sufficiently large to accommodate the microphone (4), and

at least two suspensions (3) for the microphone (4), preferably located at the ends of the retaining element (2) and being fixed to the same, the suspensions (3) comprising elastic bands, rubber bands or the like, stretched diametrically across the retaining element (2), and forming a connection between the microphone (4) and the microphone mounting device (1) that has very little acoustic conductivity, characterized in that the adjustment means (5) comprises two tightenable joints (15,16) having pivot axes directed perpendicularly with respect to each other, each suspension (3) comprising at least two bands arranged in an angle with respect to each other.

6. Microphone mounting device in accordance with claim 5, characterized in that the adjustment means (5) is arranged to be fixed to existing stands through arms and joints (30,35,39 and 40) at a clamp (25) having two arms (26,27), which arms (26,27) are mutually pivotable for stands having different pipe dimensions

7. Microphone mounting device for mounting of a generally elongate microphone to a stand, an instrument, such as acoustic a wind strument, comprising a fixing device (61) connected to the microphone mounting device,
a generally cylindrical retaining element (50a) for the microphone, the internal diameter of the retaining element being sufficiently large to accommodate the microphone, and

at least two suspensions (59,60) for the microphone, preferably located at the ends of the retaining element (50a) and being fixed to the same, the suspensions (59,60) comprising elastic bands, rubber bands or the like, stretched diametrically across the retaining element (50a) and forming a connection between the microphone and the
5 microphone mounting device which has very little acoustic conductivity, characterized in that the cylindrical retaining element is formed as two generally cylindrical elements forming an external housing (50a) and an internal housing (50b), respectively, having a common longitudinal axis (50), in which the internal housing (50b) is located coaxially with, and inside the external housing
10 (50a), so that the respective housings can be turned independently about the other, and about the common longitudinal axis (50);

at least four axially extending pins (55,56,57,58) connected with each end of the internal housing (50b) and distributed around the periphery of the internal housing;
at least four axially extending carrier pins (51,52,53,54) connected to the external
15 housing (50a) at each end of the latter and being distributed around the periphery of the external housing at locations corresponding to the positions of the pins (55,56,57,58) of the internal housing (50b), but at a different distance from the longitudinal axis (50) of the housings with respect to the pins (55,56,57,58); and
each suspension (59,60) comprising at least two elastic bands stretched across the
20 respective pins (55,56) and (57,58).

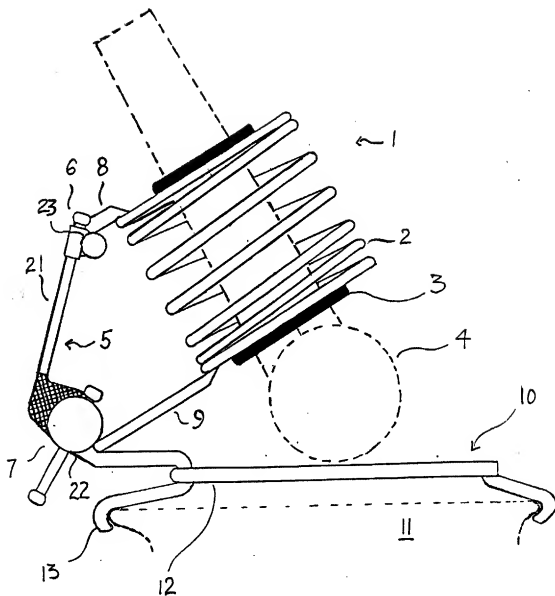
8. Microphone mounting device in accordance with claim 7, characterized in that the external housing (50a) is provided with a slit shaped recess (62) formed in the periphery of the external house, and the fixing device (61) extending through the slit shaped recess (62) and being connected to the
25 internal housing (50b).

9. Microphone mounting device in accordance with claim 7 or 8, characterized in that the pins (51,52,53,54) of the external housing (50a) are located in a greater distance from the longitudinal axis (50) of the housings, as compared with the carrier pins (55,56,57,58) of the internal housing (50b).

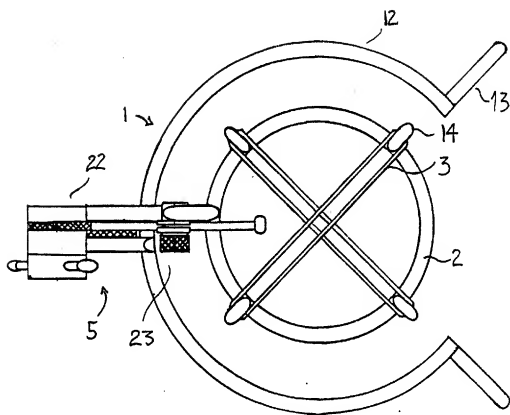
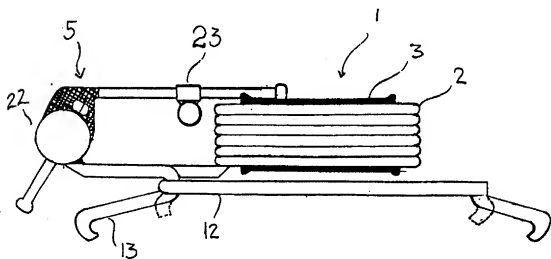
30 10. Microphone mounting device in accordance with anyone of claims 7-9, characterized in that the fixing device (61) comprises a resilient, open, annularly shaped mount (12), provided with at least three fastener hooks (13),

arranged to establish an engagement with the mouth of a wind instrument, the resilient mount (12) urging the fastener hooks (13) towards the center of the instrument mouth.

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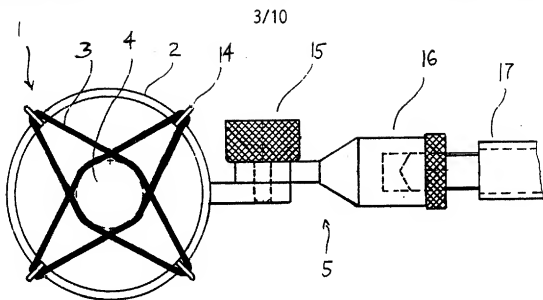
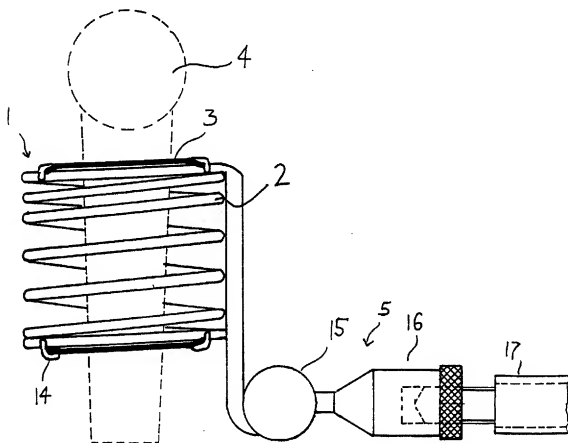
**Fig.1****SUBSTITUTE SHEET**

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**Fig. 2**

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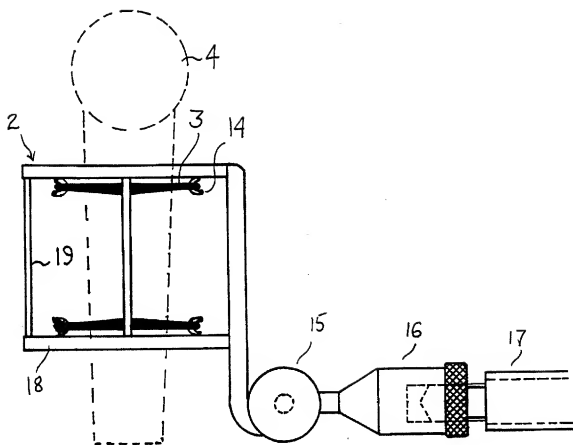
Fig. 3

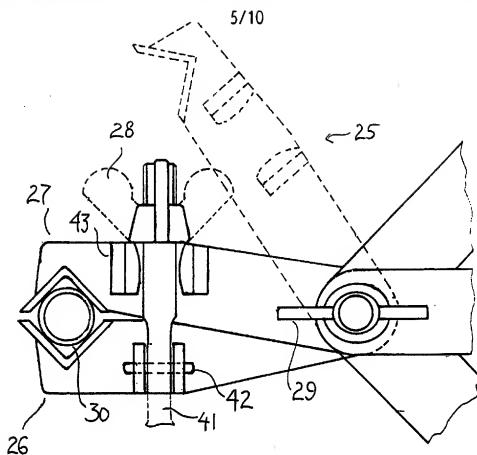
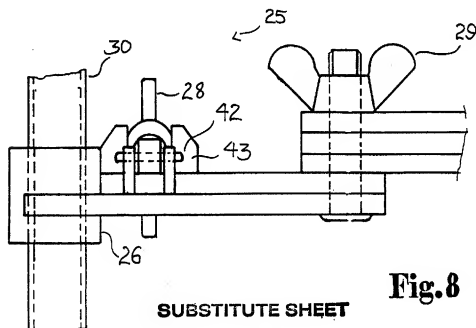
**Fig. 4**

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Fig. 5

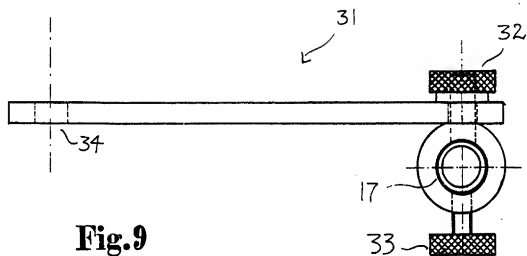
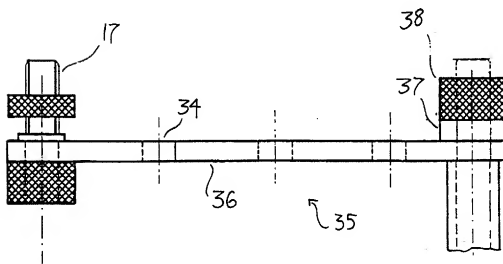
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**Fig.6****SUBSTITUTE SHEET**

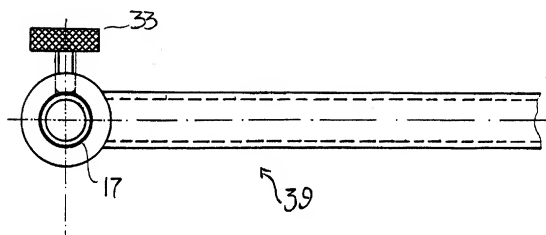
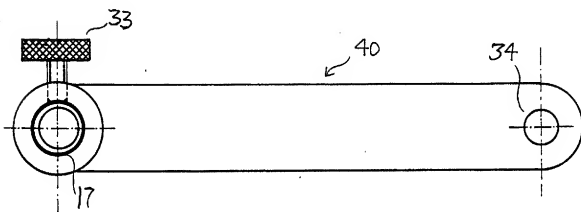
**Fig. 7****Fig. 8**

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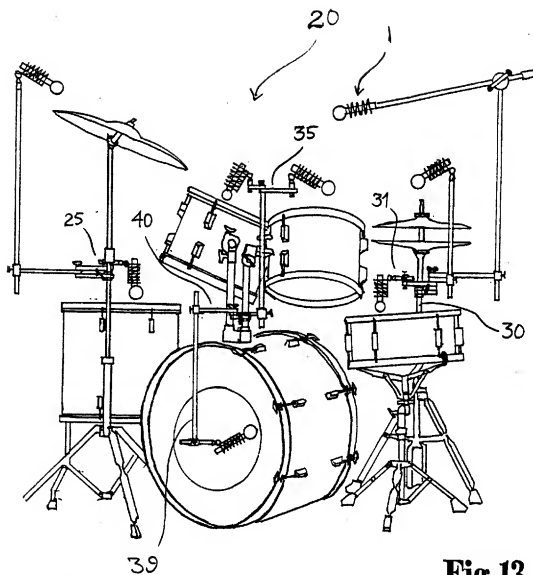
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**Fig.9****Fig.10****SUBSTITUTE SHEET**

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**Fig.11****Fig.12**

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**Fig.13**

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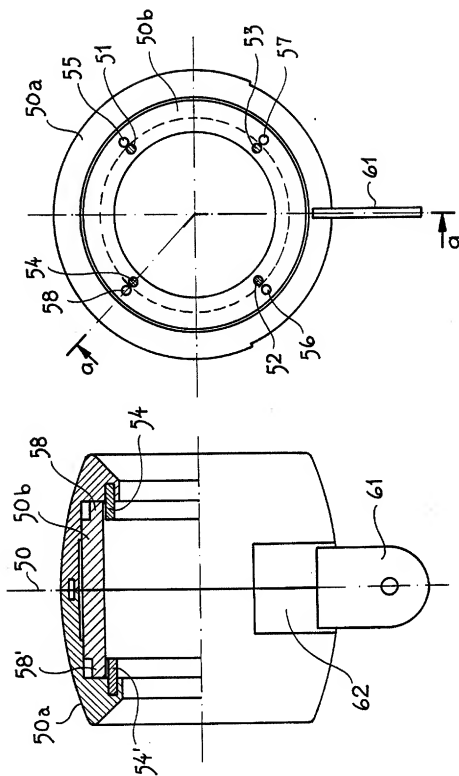


Fig. 14a

Fig. 14

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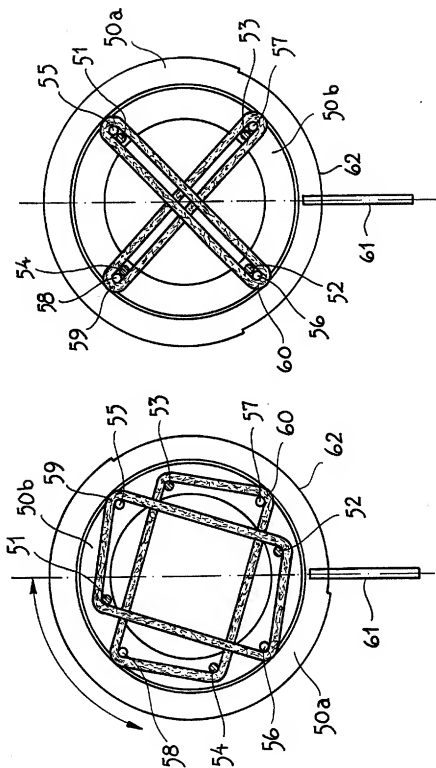


Fig. 15a

Fig. 15

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 93/00123

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: H04R 1/08, G10D 9/00, G10D 13/00, G12B 3/04, F16F 1/46
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: H04R, G12B, G10D, G10G, F16F, F16M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DIALOG, CLAIMS, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4396807 (GEORGE W BREWER), 2 August 1983 (02.08.83), figures 1-3, abstract --	1-2,5-6
Y	EP, A2, 0423858 (SCHRIER. S), 24 April 1991 (24.04.91), figures 1-4, abstract --	1-2
Y	US, A, 4466596 (MARTIN B COHEN), 21 August 1984 (21.08.84), figures 1-8, abstract -- -----	5-6

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT
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